IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : **10/621,003**

Applicant : **BRULS et al.**

Filed : **7/16/2003**

Confirmation : **9123**

TC/A.U. : **2621**

Examiner : **ANYIKIRE, Chikaodili E.**

Atty. Docket : **NL-030905**

Title: **VIDEO DECODER LOCALLY USES MOTION-COMPENSATED INTERPOLATION TO RECONSTRUCT MACRO-BLOCK SKIPPED BY ENCODER**

Mail Stop: **APPEAL BRIEF - PATENTS**
Commissioner for Patents
Alexandria, VA 22313-1450

REPLY BRIEF UNDER 37 CFR 41.41

Sir:

This is a Reply Brief in response to the Examiner's answer dated 21 May 2009 in the subject application.

RESTATEMENT OF GROUNDS OF REJECTION

The Examiner has withdrawn the rejection of claim 19 under 35 U.S.C. 101 (Examiner's Answer, page 7, third line from the bottom).

Claims 17-18 stand rejected under 35 U.S.C. 101.

Claims 1-21 stand rejected under 35 U.S.C. 102(e) over Hosono (USP 5,796,438).

REMARKS REGARDING EXAMINER' ANSWER

Claims 17-18

The Examiner acknowledges that a "claimed 'computer readable medium encoded with a computer program' is a computer element which defines structural and function interrelationships between the computer program and the rest of the computer, and is statutory" (Examiner's Answer, page 4, last five lines), and yet maintains that the applicants' claimed "Computer readable medium that includes control software for installing on an electronic device for encoding (decoding) a video picture" (applicants' claim 17 (18)) is not statutory under 35 U.S.C. 101. The applicants are at a loss to understand the basis for the Examiner's rejection. The Examiner has not clearly explained how a "computer readable medium encoded with a computer program", which is statutory, differs from a "computer readable medium that includes control software".

The Examiner references "data structures not claimed as embodied (or encoded with or embedded with) in a computer readable medium" and "computer programs claimed as computer listings, instructions or codes" as being unpatentable under 35 U.S.C. 101, but the applicants do not claim a data structure, and do not claim a computer listing, instruction, or code, per se.

Because the applicants specifically claim a computer readable medium that includes control software, and do not claim a data structure or computer listing, instruction, or code, the applicants respectfully maintain that the rejection of claims 17-18 is unfounded, and should be reversed by the Board.

Claims 1-8, 18, and 20-21

The Examiner asserts that Hosono discloses determining if a segment can be reconstructed from another video picture based on motion-compensated interpolation at column 9, lines 30-40 and Fig. 9. As noted in the applicants' Appeal Brief, Hosono is silent with regard to determining whether a video segment can be reconstructed based on an interpolation. At the cited text, Hosono discloses:

> "As for the P-picture, basically a difference from the temporally previous I-picture or P-picture is encoded and transmitted. As for the B-picture, basically a difference from mean values of a temporally previous frame and/or a temporally succeeding frame is found and the difference is encoded and transmitted.
> If the difference (encoded difference) is to be transmitted, as in the case of the P- or B-picture, a motion vector with respect to the picture of the frame the difference from which is calculated, that is a prediction picture, is transmitted along with the difference data. The motion vector is the frame-to-frame motion vector for forward prediction and/or frame-to-frame motion vector for backward prediction." (Hosono, column 8, lines 28-40.)

In Hosono, if ***any*** differences exist between two images, the differences are encoded and transmitted. Contrarily, in the applicants' invention, if the differences are determinable by interpolation, so that the image can be reconstructed based on the interpolation, the image is skipped, and neither the image nor the differences is transmitted.

Hosono addresses an MPEG-related problem that causes flicker to occur when high resolution still pictures are displayed on a lower resolution display, and discloses a solution "whereby picture information devoid of flicker may be generated even when displaying on a television screen picture information of high resolution or picture information at a usual resolution and a contracted size" (Hosono, column 1, lines 32-34). Hosono recognizes that MPEG is designed to process moving pictures, and transforms a still picture into a two-frame moving picture:

> "In view of the foregoing, the picture information processing apparatus of the embodiment employs the averaging interpolation method exploiting the MPEG system bitstream as hereinafter explained for speedily and easily generating a flicker-free averaged still picture from a high-resolution still picture desired to be displayed on a television screen. The still picture constitutes a moving picture in the present embodiment." (Hosono, column 4, lines 49-56.)

To assure that the 'moving picture' representing the still picture is rendered at a lower resolution while still avoiding flicker, using a conventional MPEG decoder, Hosono discloses the generation of an 'averaged picture' that is arranged to assure that a conventional MPEG decoder will present the same image regardless of the type of picture (I, P, or B) that the decoder considers the current type.

In the Examiner's Answer, the Examiner notes that Hosono discloses interpolation at FIGs. 5A and 5B. This is correct, but this interpolation is not related to an interpolation between images. Hosono's performs line-based or pixel-based interpolation to ***create*** the aforementioned averaged picture that is shifted by a half pixel. Of particular note, ***both*** the original picture and the averaged picture are sent to the MPEG decoder (i.e. neither are 'missing'):

> "Referring to the example of FIGS. 2A and 2B[1], the original picture data (reference picture data) of FIG. 2a is first fed to the decoder portion (configuration downstream of the bitstream buffer 201) of the MPEG decoder and restored so as to be stored in the frame memory. An averaging bit stream having a motion vector of shifting the pixel position by 0.5 only in the vertical direction is routed to the decoder. The averaging bitstream is pre-formed and stored in the averaged bitstream storage area 305 of the ROM 304. In the decoder, decoding in accordance with the MPEG rule is carried out by the ***original picture data restored*** and stored in the frame memory ***and by the averaging bitstream*** vertically shifting the vector by 0.5. Thus the decoder outputs vertically averaged interpolated picture data as shown in FIG. 2B." (Hosono, column 5, lines 17-31).

Within Hosono's conventional MPEG decoder, the original picture is identified as having a motion vector of a half-pixel motion (FIG. 3A, forward codes = 1), and the averaged/averaging picture is identified as having a zero motion vector (FIG. 3B, forward codes = 0, with note stating "MV difference is "0"). The half-pixel processing unit 218 will shift the original picture by a half-pixel, based on the half-pixel motion vector, while the half-pixel processing unit 216 will not shift the averaged picture. These (now identical) decoded blocks are summed by the adder 219, then halved by the divider 220, producing the same values as the blocks output by the half-pixel processing units 216 and 218.

[1] In Hosono, FIGs. 2A-2B, 4A-4B, 5A-5B, and 6A-6B indicate different interpolation techniques. As taught by Hosono, as long as the CPU 303 creates the averaged/averaging bitstream 305 in the same manner as the half-pixel processing unit 218 in the (conventional) MPEG decoder, Hosono's technique will generate a flicker-free response. Hosono describes the details with regards to FIGs. 2A-2B, and does not repeat this explanation for FIGs. 5A-5B.

Of particular note, each of the outputs a, b, and c of the switch 220, which is controlled based on the particular type of macro-block being decoded, will have exactly the same values, thereby eliminating any flicker as the MPEG decoder decodes a still image that is presented as moving picture. This is the essence of Hosono's invention; by creating an averaged image that corresponds to an interpolation of the original high resolution still image, and providing the original and averaged images to a conventional MPEG decoder with a particular motion-vector configuration, a stable lower-resolution image will be produced.

Hosono does not teach determining whether a decoded image could be generated based on an interpolation, and avoiding encoding based on this determination. Contrarily, Hosono discloses ***purposely creating an interpolated image*** and ***sending it to the decoder***, to provide redundant information to the decoder so as to eliminate flicker in the decoded image.

Because Hosono fails to teach determining if a segment can be reconstructed from at least another video picture based on motion-compensated interpolation applied to the other video picture, and does not teach skipping the encoding of the segment if it can be reconstructed, as specifically claimed in each of claims 1, 5, and 18, the applicants respectfully maintain that the rejection of claims 1-8, 18, and 20-21 under 35 U.S.C. 102(e) over Hosono is unfounded, and should be reversed by the Board.

Claims 9-17 and 19

The Examiner asserts that Hosono discloses reconstructing a missing segment from motion-compensated interpolation applied to at least another video picture, and references column 8, lines 30-40 to support this assertion (Examiner's Answer, page 7, lines 1-3). At the cited text, Hosono discloses:

> "As for the P-picture, basically a difference from the temporally previous I-picture or P-picture is encoded and transmitted. As for the B-picture, basically a difference from mean values of a temporally previous frame and/or a temporally succeeding frame is found and the difference is encoded and transmitted.

> If the difference (encoded difference) is to be transmitted, as in the case of the P- or B-picture, a motion vector with respect to the picture of the frame the difference from which is calculated, that is a prediction picture, is transmitted along with the difference data. The motion vector is the frame-to-frame motion vector for forward prediction and/or frame-to-frame motion vector for backward prediction."

As is clearly evident, the above cited text does not address reconstructing a 'missing segment', and therefore cannot be said to teach reconstructing such a missing segment from an interpolation applied to another video picture.

Hosono's P and B picture segments are not 'missing segments', and Hosono does not teach that segments are reproduced if these P and B segments are missing. To the contrary, Hosono discloses using the convention MPEG "GOP" (Group of Pictures) construct (Hosono's FIG. 10), and does not teach or suggest any means for coping with a missing picture/segment.

In the Examiner's Answer, the Examiner notes that Hosono discloses reconstructing of an image using an interpolation at FIGs. 5A and 5B. However, as noted above, in FIGs. 5A and 5B, Hosono discloses ***creating*** a new image by interpolation of lines or pixels of a still image, and does not teach reconstructing a ***missing*** image.

Because Hosono does not teach determining if a segment of a picture is missing and does not teach reconstructing the missing segment from motion-compensated interpolation applied to at least another video picture, as specifically claimed by the applicants, the applicants respectfully maintain that the rejection of claims 9-17 and 19 under 35 U.S.C. 102(e) over Hosono is unfounded, and should be reversed by the Board.

CONCLUSIONS

Because the applicants specifically claim a computer readable medium that includes control software that enables an electronic device to encode or decode a video picture, the applicants respectfully maintain that the rejection of claims 17-18 is unfounded, and should be reversed by the Board.

Because Hosono does not teach determining whether a segment of a picture can be reconstructed at a decoder by interpolation and does not teach skipping the encoding of the segment if it can be reconstructed by the decoder, and because Hosono specifically teaches creating an interpolated image and sending it to the decoder, the applicants respectfully request that the Examiner's rejection of claims 1-8, 18, and 20-21 under 35 U.S.C. 102(e) over Hosono be reversed by the Board, and the claims be allowed to pass to issue.

Because Hosono does not teach determining if a segment of a picture is missing, and does not teach reconstructing the missing segment by interpolation, and because Hosono specifically teaches creating an interpolated image and sending it to the decoder, the applicants respectfully request that the Examiner's rejection of claims 9-17 and 19 under 35 U.S.C. 102(e) over Hosono be reversed by the Board, and the claims be allowed to pass to issue.

Respectfully submitted,

/Robert M. McDermott/
Robert M. McDermott, Esq.
Registration Number 41,508
Phone: 804-493-0707
for: Kevin C. Ecker
Reg. 43,600
914-333-9618

Please direct all correspondence to:
Corporate Counsel
Philips Intellectual Property and Standards
P.O. Box 3001
Briarcliff Manor, NY 10510-8001
Phone: (914) 333-9618
Fax: (914) 332-0615